DEPARTMENT OF MATHEMATICS II- B. Sc PHY & CHE I- SESSIONALEXAM
VIVEKANANDA COLLEGE IV SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 10:01:2019 TIME: 2 HOURS

MATHEMATICS-II (05AT02)

Section A

Answer all the questions: **10×1=10**

1. The order of the differential equation $\left[1+\frac{dy}{dx}\right]^{\frac{3}{2}} = a\frac{d^2y}{dx^2}$ is _____
   a) 3 b) 2 c) 4 d) 1
2. The order of the differential equation $y' = 3x^2 + 7$ is ________
   a) 3 b) 2 c) 4 d) 1
3. The degree of the differential equation $\frac{dy}{dx} + ycotx = 0$ is ________
   a) 1 b) 2 c) 4 d) 3
4. The degree of the differential equation $\left[1+\frac{dy}{dx}\right]^{\frac{5}{4}} = a\frac{d^2y}{dx^2}$ is ____________.
   a) 2 b) 5 c) 6 d) 4.
5. The order of the differential equation $(\frac{dy}{dx})^4 = \frac{d^6y}{dx^6}$ is _____________.
   a) 7 b) 6 c) 5 d) 3
6. $d(xy) =$
   a) $xy' + yx'$ b) $xy' - yx'$ c) $-xy' + yx'$ d) $-(xy' + yx')$.
7. $d\left[\frac{x}{y}\right] =$ ___________.
   a) $\frac{ydx-xdy}{y^2}$ b) $\frac{xdy-ydx}{y^2}$ c) $2\frac{ydx-xdy}{x^2}$ d) $2\frac{xdy-ydx}{y^2}$
8. The derivative of $sin\,x$ is
   a) $cos\,x$ b) $-cos\,x$ c) $sin\,x$ d) $-sin\,x$.
9. If $y = ax^2$, then $y' =$_______________.
   a) $2a$ b) $2x$ c) $2ax$ d) 0
10. The derivative of $\frac{1}{x^4}$ is _____________
   a) $\frac{4}{x^5}$ b) $-\frac{4}{x^5}$ c) $\frac{4}{x^3}$ d) $-\frac{4}{x^3}$

SECTION – B

Answer Any five of the following questions: **5×2=10**

Find the order and degree of the equation

11.$yy'' + (y')^2 = 0.$

12. $\sqrt{y' + y} = sinx$

13. $[1 + (y')^2]^3 = ky''$

14.Eliminate c from $y = cx^2 + c - c^3$..

15.Eliminate c_1 and c_2 from $y = c_1e^{2x} + c_2e^{-2x}$.

16.Find the differential equation $y = \sin(logx)$.

17.Solve $(1 - x)dy - (1 + y)dx = 0$.

<u>SECTION – C</u>

<u>Answer any three of the following questions</u> **3×6=18**

18. Solve i) $y' = \left(\frac{y}{x}\right) + \tan(\frac{y}{x})$

ii) $y' + \frac{1+y^2}{1+x^2} = 0$

19. Solve $\frac{dy}{dx} = \frac{x+y}{y-x}$.

20. Solve $\frac{dy}{dx} = \frac{x-y}{x+y}$.

21.Solve $y^2dx + (xy + x^2)dy = 0$.

22. Solve $\frac{dy}{dx} = \frac{6x-4y+3}{3x-2y+1}$.

<u>SECTION-D</u>

<u>Answer any one of the following questions</u> **1×12=12**

23. Solve $\frac{dy}{dx} + \frac{10x+8y-12}{7x+5y-9} = 0$.

24. Solve

a) $\frac{dy}{dx} = \frac{y^3+3x^2y}{x^3+3xy^2}$ b) $(x^2 + y^2)dx = 2xydy$.

ALL THE BEST

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II – CHEMISTRY& PHYSICS**	**SUBJECT**	**: ALLIED**
TITLE	**: MATHEMATICS – III**	**SUB. CODE**	**: O5AT03**
MONTH & YEAR	**: JAN 2019**	**DATE**	**: 04/01/2019**
TIME	**: 2 HOURS**	**MAX. MARKS**	**: 50**

I SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS ($\mathbf{10 \times 1 = 10}$)

1. In a partial differential equations, p denotes:

a) $\frac{\partial z}{\partial x}$ b) $\frac{\partial z}{\partial y}$ c) $-\frac{\partial z}{\partial x}$ d) $-\frac{\partial z}{\partial y}$

2. In a partial differential equations, q denotes:

a) $\frac{\partial z}{\partial x}$ b) $\frac{\partial z}{\partial y}$ c) $-\frac{\partial z}{\partial x}$ d) $-\frac{\partial z}{\partial y}$

3. In a partial differential equations, r denotes:

a) $\frac{\partial^2 z}{\partial x^2}$ b) $\frac{\partial^2 z}{\partial y^2}$ c) $\frac{\partial^2 z}{\partial x \partial y}$ d) $-\frac{\partial^2 z}{\partial x^2}$

4. In a partial differential equations, s denotes:

a) $\frac{\partial^2 z}{\partial x^2}$ b) $\frac{\partial^2 z}{\partial y^2}$ c) $\frac{\partial^2 z}{\partial x \partial y}$ d) $-\frac{\partial^2 z}{\partial x^2}$

5. In a partial differential equations, t denotes:

a) $\frac{\partial^2 z}{\partial x^2}$ b) $\frac{\partial^2 z}{\partial y^2}$ c) $\frac{\partial^2 z}{\partial x \partial y}$ d) $-\frac{\partial^2 z}{\partial x^2}$

6. The solution containing as many arbitrary constants as there are independent variables is called______.

a) Complete integral b) Singular integral c) Particular integral d) General integral

7. The solution obtained by giving particular values to the arbitrary constants in a complete integral is called ______.

a) Complete integral b) Singular integral c) Particular integral d) General integral

8. In a partial differential equations, the general term of Standard 1 is ________.

a) $f(p,q) = 0$ b) $F(x,p,q) = 0$ c) $f_1(x,p) = f_2(y,q)$ d) $z = px + qy + f(p,q)$

9. In a partial differential equations, the general term of Standard 2 is ________.

a) $f(p,q) = 0$ b) $F(x,p,q) = 0$ c) $f_1(x,p) = f_2(y,q)$ d) $z = px + qy + f(p,q)$

10. In a partial differential equations, the general term of Standard 3 is ________.

a) $f(p,q) = 0$ b) $F(x,p,q) = 0$ c) $f_1(x,p) = f_2(y,q)$ d) $z = px + qy + f(p,q)$

SECTION-B

ANSWER ANY FIVE QUESTIONS ($\mathbf{5\ X\ 2 = 10}$)

11. Form the p.d.e by eliminating the arbitrary constants from z = ax + by + ab.

12. Form the p.d.e by eliminating the arbitrary function from z = f(x + ay).

13. Form the p.d.e by eliminating the arbitrary function from z = f(x^2 – y^2).

14. Solve p + q = 1.

15. Solve pq + p + q = 0.

16. Solve $p^2 + q^2 = 1$.

17. Solve $yzp + zxq = xy$.

SECTION – C

ANSWER ANY THREE QUESTIONS ($3 X 6 = 18$)

18. Form the p.d.e by eliminating the arbitrary functions from $z = f(x + iy) + g(x – iy)$.

19. Form the p.d.e by eliminating the arbitrary function from $g(x + y + z, x^2 + y^2 + z^2)$.

20. Solve $x^2 p + y^2 q = z^2$.

21. Solve $x(y – z) p+ y(z – x) q = z(x – y)$.

22. Solve $z = px + qy + pq$.

SECTION – D

ANSWER ANY ONE QUESTION ($1 X 12 = 12$)

23. Solve $(x^2 – yz) p + (y^2 – zx) q = z^2 – xy$.

24. Solve $z = px + qy + p^2 + q^2$.

***** All the best *****

Department of mathematics

sub.code:05AT41

Date: **Programming in C++** marks:50

Answer all Questions (10× 1=10)

1. --------- is the collection of elements of function and variables

   (A) Class (B) object (C) array (D) structure

2. --------- reduce the length and complenify of program

   (A) Function (B) pointer (C) Array (D) string

3. ---------- has the same name as class

   (A) Function (B) object (C) array (D)sturucture

4. Which operator cannot be overloaded?

   (A) :: (B) + (C) * (D) >>

5. The group of character is called………

   (A) Method (B) member (C) string (D) object

6. which is the assignment operator

   (A) += (B) * (C) ? (D) =

7. Which one of the scope resolution operator

   (A) = (B) ≠ (C)? (D)::

8. Which is the Relational operator………

   (A) < (B) && (C)* (D) none

9. Which is increment operator…….

   (A) + + (B) = (C) ! (D) None

10. Which is decrement operator……

    (A) ++ (B) − − (C) ∗ (D) None

SECTION-B

Answer any Five Question (5×2=10)

11. What is an function

12. Define static

13.Define call by reference

14. Define Return state ment

15. Define Default Arguments

16. Define const Arguments

17. Explain inline function

SECTION-C

Answer Any Three Questions (3×6=18)

18. Write the benefits of oops in c++

19.Write about the structure of c++ program

20. Explain any five math library function in c++

21. Explain about inline function

22. Explain about switch statement in c++

SECTION-D

Answer any One Question (1×12=12)

23.Explain the basic concept of oops

24. Discuss about various looping statement in c++

*********ALL THE BEST*********

DEPART MENT OF MATHEMATICS I- B. Sc MATHS I- SESSIONALEXAM
VIVEKANANDA COLLEGE II SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 11:01:2019 TIME: 2 HOURS

ANALYTICAL GEOMETRY (3D) AND VECTOR CALCULUS- 05CT22

Section A

Answer all the questions: **10×1=10**

1. The direction cosines of the *x*- axis are ______. (CO1)
   a) 1,0,0 b) 0,1,1 c) 1,1,0 d) 0,0,1.
2. The three coordinate planes have ________ (CO1)
   a) the origin as a point in common
   b) no points in common
   c) one line in common
   d) one plane in common.
3. The equation of the *xy*- plane is_______ (CO1)
   a) $x = 0$ b) $x = 0 = y$ c) $z = 0$ d) $x = 0 = z$.
4. The distance between the two points $(4, -2, 3)$ and $(2, -3, 1)$ is _______________ (CO1)
   a) 3 b) 9 c) 10 d) 4.
5. The direction ratios of the line joining (2,0,2) and (1,1,1) are (CO1)
   a) -1,-1,-1 b) -1, 1,1 c) -1,1,-1 d) 1,1,-1
6. The centroid of the triangle whose vertices are (3,1,3); (10,1,5) and (-1,1,-5) is ________ (CO1)
   a) (3,1,1) b) (5,1,1) c) (4,1,1) d) (-4,1,1)
7. If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ then $\nabla.\vec{r} =$ ____ (CO4)
   a) 1 b) 0 c) 3 d) $x^2 + y^2 + z^2$
8. A vector function $\vec{f}$ is called solenoidal if _____ (CO4)
   a) div $\vec{f} = 0$ b) grad$\vec{f} = 0$ c) curl$\vec{f} = 0$ d) div$\vec{f} = 1$
9. A vector function $\vec{f}$ is called irrotational if _____ (CO4)
   a) div $\vec{f} = 0$ b) grad$\vec{f} = 0$ c) curl$\vec{f} = 0$ d) div$\vec{f} = 1$
10. If $\nabla\vec{\varphi}$ is solenoidal, then $\nabla^2\vec{\varphi} =$ ____ (CO4)
    a) 0 b) -1 c) 2 d) 1

SECTION – B

Answer Any five of the following questions: **5×2=10**

11. Find the distance between the pairs of the two points $(1, -7,3), (7,9,1)$ and $(2, -8,1), (0, -2, -7)$. (CO1)

12. Find the direction ratios and direction cosines of the line joining the points $(1,2,-1)$ and $(2,1,3)$ (CO1)
13. Find the perimeter of the triangle whose vertices are $(1,1,1),(2,-1,3)$ and $(8,-3,0)$ (CO1)
14. Find the equation of the plane passing through the point $(1,-1,2)$ and parallel to the xy $-$plane. (CO1)
15. Find the unit normal vector to the surface $x^3 - xyz + z^3 = 1$ at the point (1, 1, 1) (CO4)
16. Show that $\nabla(\vec{a}\,.\vec{r}) = \vec{a}$ for any constant vector $\vec{a}$. (CO4)
17. prove that $\nabla.\left(\vec{f}\times\vec{g}\right) = \vec{g}\,.\left(\nabla\times\vec{f}\right) - \vec{f}\,.(\nabla\times\vec{g})$ (CO4)

SECTION – C

Answer Any three of the following questions: **3×6=18**

18. Show that $(-5,6,8),(1,8,11),(4,2,9)$ and $(-2,0,6)$ are the vertices of a square. (CO1)
19. Show that the straight lines whose direction cosines are given by $2l - m + 2n = 0$ and $lm + mn + nl = 0$ are at right angles. (CO1)
20. Find the equation of the plane (CO1)
    (i) through $(-2,-2,2),(1,1,1)$ and $(1,-1,2)$
    (ii) through $(2,2,-1),(3,4,2)$ and $(7,0,6)$
21. Find the directional derivative of $xy^2 + yz^3$ at the point (2, -1, 1) in the direction of the vector $\vec{i} + 2\vec{j} + 2\vec{k}$. (CO4)
22. Find the unit vector normal to the surface $x^2 + 2y^2 + z^2 = 7$ at $(1,-1,2)$ (CO4)

SECTION – D

Answer Any one of the following questions: **1×12=12**

23. Find the equation of the planes through the points (i) $(1,1,0),(1,2,1)$ and $(-2,2,-1)$ (ii) $(3,1,2)$, $(4,-2,-1)$ and $(1,2,4)$. Also find the angle between the lines. (CO1)
24. Compute the divergence and curl of the vector $\vec{F} = xyz\vec{i} + 3x^2y\vec{j} + (xz^2 - y^2z)\vec{k}$ at $(1,2,-1)$. (CO4)

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II - MATHS**	**SUBJECT**	**: CORE**
TITLE	**: SEQUENCES AND SERIES**	**SUB. CODE**	**: 05CT41**
MONTH & YEAR	**: JAN 2019**	**DATE**	**: 07/01/2019**
TIME	**: 2 HOURS**	**MAX. MARKS**	**: 50**

I SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS ($10 \times 1 = 10$)

1. Let A = (0,1), the g.l.b and l.u.b of A is _____

(A) 1,0 (B) 0,1 (C) 0,0 (D)1,1

2. Let A ={1,3,5,6} then g.l.b of A =1 and l.u.b of A = _____

(A) 2 (B)3 (C) 5 (D)6

3. For any two real numbers x and y then $|x-y|$ is _____

(A) 0 (B) 1 (C) $\geq \| x| - |y\|$ (D) $\leq \| x| - |y\|$

4. A sequence (a_n) is said to be _____ if there exists a real number k such that $a_n \geq k$ for all n.

(A) bounded above (B) bounded below (C) unbounded (D) both bounded

5. The sequence 1,-1,1,-1,… is represented as _____

(A) $(-1)^n$ (B) $((-1)^n)$ (C) $((-1)^{n+1})$ (D) $(-1)^{n+1}$

6. The function $f(n) = \left\{ \frac{n}{n+1} \right.$ determines the sequence _____

(A) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$ (B) $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \ldots$ (C) $1, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \ldots$ (D) 0,1,1,2,2,3,3,…

7. The sequence 1,1,2,3,5,8,13,... is called _____

(A) Cauchy sequence (B) Fibonacci's sequence (C) Geometric sequence (D) Harmonic sequence

8. The following statement are true except…….

(A) $(\frac{1}{n})$ is a convergent sequence (B) $(\frac{1}{n})$ is a bounded sequence

(C) $(\frac{1}{n})$ is a monotonic sequence (D) $(\frac{1}{n})$ is a strictly monotonic decreasing sequence

9. The range of the sequence $(1+(-1)^n)$ is ……….

(A) **N** (B) **Z** (C) {0,1} (D) {0,2}

10. $f : A \to R$ is said to be a _____ if its range is a bounded subset of **R**.

(A) bounded function (B) unbounded function (C) onto function (D) into function

SECTION-B

ANSWER ANY FIVE QUESTIONS ($5 \, X \, 2 = 10$)

11. If a, b & c are any three distinct positive real numbers, prove that $a^2 + b^2 + c^2 > ab + bc + ca.$

12. Prove that $a^7 + b^7 + c^7 > abc\,(a^4 + b^4 + c^4)$.

13. Define bounded sequence.

14. Define convergent & divergent sequences.

15. Prove that $(n^2) \to \infty$

16. Prove that if $(a_n) \to 0$ and $a_n > 0$ for all $n \in N$, then $\left(1/a_n \right) \to \infty$.

17. Prove that if $(a_n) \to l$, $(b_n) \to l$ and $a_n \le c_n \le b_n$ for all n, then $(c_n) \to l$.

SECTION – C

ANSWER ANY THREE QUESTIONS $(3 \; X \; 6 = 18)$

18. State and prove Cauchy-Schwarz inequality.

19. State and prove Weierstrass' inequalities.

20. Prove that any convergent sequence is a bounded sequence.

21. Prove that a sequence cannot converge to two different limits.

22. Show that $\lim_{n\to\infty} n^{\frac{1}{n}} = 1$.

SECTION – D

ANSWER ANY ONE QUESTION $(1 \; X \; 12 = 12)$

23. State and prove Triangle inequalities.

24. Prove that

(a) A monotonic increasing sequence which is bounded above converges to its l.u.b.

(b) A monotonic increasing sequence which is not bounded above diverges to ∞.

*****All the best*****

DEPART MENT OF MATHEMATICS III- B. Sc MATHS I- SESSIONAL EXAM
VIVEKANANDA COLLEGE VI SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 10:01:2019 TIME: 2 HOURS

OPERATIONS RESEARCH - 05EP62

Section A

Answer all the questions: **10×1=10**

1. Inventory in general are build up to __________
   a) Satisfy demand during period of replenishment b) Carry reserve stocks to avoid shortages
   c) Keep pace with changing market conditions d) All the above.
2. Economic Order Quantity (EOQ) results in
   a) Equalization of carrying cost and procurement cost b) Minimization of set up cost
   c) Favorable procurement price d) reduced chances of stock outs
3. If small orders are placed frequently (rather than placing large orders infrequently), then total inventory cost is
   a) Reduced b) increased c) either reduced or increased d) minimized
4. Which costs can vary with order quantity?
   a) Unit cost only b) holding cost only c) Re-order cost only d) all the above
5. If the unit cost rises, will optimum order quantity _______
   a) Increases b) decreases c) either increases or decreases d) no change
6. If the total investment in stock is limited, will the best order quantity for each item be
   a) Greater than EOQ b) equal to EOQ c) less than EOQ d) greater than or equal to EOQ
7. If EOQ is calculated, but an order is than placed which is smaller than this, will the total inventory cost
   a) Increases b) decreases c) either increases or decreases d) no change
8. The set-up cost is also called
   a) Order cost b) unit cost c) holding cost d) inventory carrying cost
9. The carrying cost is also called
   a) Order cost b) unit cost c) holding cost d) inventory carrying cost
10. The Shortage cost is also called
    a) Order cost b) stock out cost c) unit cost d) holding cost.

SECTION – B

Answer Any five of the following questions: **5×2=10**

11. Define set-up cost
12. A shipbuilding firm uses rivets at a constant rate of 20,000 numbers per year. Ordering costs are Rs. 30 per year. The rivets Rs.1.50 per number. The holding cost of rivets is estimated to be 12.5% of unit cost per year. Determine EOQ.
13. Define carrying cost
14. Define production cost
15. An item is produced at rate of 50 items per day. The demand occurs at the rate of 25 items per day.If the set-up cost is Rs. 100 and holding cost is Re. 0.01 per unit of item per day. Find EOQ
16. Define order cycle
17. An oil engine manufacturer purchases lubricants at the rate of Rs.42 per piece from a vendor. The requirement of these lubricants is 1,800 per year. What should be the order quantity per order, if the cost per placement of an order is Rs.16 and the inventory carrying charge per rupee per year is only 20 paise.

SECTION – C

Answer Any three of the following questions: **3×6=18**

18. A company operating 50 weeks in a year is concerned about its stocks of copper cable. This costs Rs. 240 a metre and there is a demand for 8,000 metres a week. Each replenishment costs Rs.1050 for administration and Rs.1650 for delivery,while holding costs are estimated at25 % of value held a year. Assuming no shortages are allowed,what is optimum inventory policy for the company? How would this analysis differ if the company wanted to maximize profit rather than minimize cost?

19. A manufacturer has to supply his customer with 24,000 unitsofhis product per year. This demand is fixed and known. Since the unit is used by the customer in an assembly line operation and the customer has no storage space for the units, the manufacturer must ship a day's supply each day. If the manufacturer fails to supply the required units, he will lose the amount and probably his business. Hence the cost of shortage is assumed to be infinite and consequently, none will be tolerated. The inventory holding cost amounts to 0.01 per unit per month and the set-up cost preproduction run Rs. 350. Find optimum lot size and the length of the optimum production run.

20. A factory follows an economic order quantity system manufacturing stocks of one of its component requirements.The annual demand is for 24,000 units, the cost of placing an order is Rs.300 and the component cost is Rs.60 per unit. The factory has imputed 24 % as the inventory carrying rate.

(i) Find the optimal interval for placing orders, assuming a year is equivalent to 360 days.

(ii) If it is decided to place only one order per month, how much extra cost does the factory incur per year as a consequence of this decision

21. The details of a part to be machined are as follows:

Annual requirement = 2,400 pieces, Machine rate = 10 pieces/shift, Number of working days in the year = 320 shifts, Cost of machining a component = Rs. 100 per piece, Inventory carrying cost per annum = 12 % of value and Set-up cost per production run = Rs. 400. Find EOQ, optimal number of orders(n^0) and the production run(t^0).

22. A manufacturing company uses an EOQ approach in planning its production of gears. The following information are available. Each gear costs Rs. 250 per unit, annual demand is 60,000 gears, set-up cost are Rs.4,000 per set-up and the inventory carrying cost per month is established at 2 % of the average inventory value. When in production, these gears can be produced at the rate of 400 units per day and the company works only for 300 days in a year. Determine the economic lot size, the number of production runs per year and the total inventory costs.

SECTION – D

Answer Any one of the following questions: **1×12=12**

23. a) A manufacturing company needs 2,500 units of a particular component every year. The company buys it at the rate of Rs.30 per unit. The order processing cost for this part is estimated at Rs.15 and the cost of carrying a part in stock comes to about Rs. 4 per year. The company can manufacture this part internally. In that case, it saves 20 % of the price of the product. However, it estimates a set-up cost of Rs. 250 per production run. The annual production rate would be 4,800 units. However, the inventory carrying costs remain unchanged. i) Determine the EOQ and the optimal number of orders placed in a year. ii) Determine the optimum production lot size and the average duration of the production run iii) should the company manufacture the component internally or continue to purchase it from the supplier? **(10 marks)**

b) An item is produced at the rate of 50 items per day. The demand occurs at the rate of 25 items per day. If the set-up cost is Rs. 100 and the holding cost is Rs.0.01 per unit of item per day. Find EOQ. **(2marks)**

24. a) A manufacturing company purchases 9,000 parts of a machine for its annual requirements, ordering one month usage at a time. Each part costs Rs. 20. The ordering cost per order is Rs.15 and the carrying charges are 15 % of the average inventory per year. You have been assigned to suggest a more economical purchasing policy for the company. What advice would you offer and how much would it save the company per year?

b) A company plans to consume 760 pieces of a particular component. Past records indicate that purchasing department had used Rs. 12,000 for placing 15,000 orders. The average inventory was valued at Rs.45,000 and the total storage cost was Rs. 7,650 which included wages, rent, taxes, insurance, etc., related to store department. The company borrows capital at the rate of 10 % a year.

If the price of a component is Rs. 12 and the order size is of 10 components, determine: purchase cost, purchase expenses, storage expenses, capital cost and total cost per year.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II - MATHS**	**SUBJECT**	**: SBS**
TITLE	**: COMPETITIVE MATHEMATICS**	**SUB. CODE**	**: 05SB41**
MONTH & YEAR	**: JAN 2019**	**DATE**	**: 04/01/19**
TIME	**: 1 HOUR**	**MAX. MARKS**	**: 25**

I SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS ($5 \times 1 = 5$)

1. Which of the following has most number of divisors?
   (a) 99 (b) 101 (c) 176 (d) 182
2. $\frac{1095}{1168}$ when expressed in simplest form is :
   (a) $\frac{13}{16}$ (b) $\frac{15}{16}$ (c) $\frac{17}{26}$ (d) $\frac{25}{26}$
3. Find the highest common factor of 36 and 84?
   (a) 4 (b) 6 (c) 12 (d) 18
4. The value of 337.62 + 8.591 + 34.4 is :
   (a) 370.611 (b) 380.511 (c) 380.611 (d) 426.97
5. If 1.125 X 10^k = 0.001125, then the value of k is :
   (a) -4 (b) -3 (c) -2 (d) -1

SECTION – B

ANSWER ANY TWO QUESTIONS (2 X 2 = 4)

6. Find the H.C.F of 108, 288 and 360?
7. Reduce $\frac{391}{667}$ to lowest terms?
8. Evaluate: 31.004 – 17.2386?
9. If $\frac{1}{3.718} = 0.2689$, then find the value of $\frac{1}{0.0003718}$?

SECTION – C

ANSWER ANY ONE QUESTION (1 X 6 = 6)

10. Find the L.C.M of 72, 108 and 2100?
11. Simplify: $\frac{0.05\ X\ 0.05\ X\ 0.05 + 0.04\ X\ 0.04\ X\ 0.04}{0.05\ X\ 0.05 - 0.05\ X\ 0.04 + 0.04\ X\ 0.04}$?

SECTION –D

ANSWER ANY ONE QUESTION (1 X 10 = 10)

12. Find the least number which when divided by 6,7,8,9 and 12 leaves the same reminder 1 in each case?
13. Arrange the fractions $\frac{5}{8}$, $\frac{7}{12}$, $\frac{13}{16}$, $\frac{16}{29}$ and $\frac{3}{4}$ in ascending order of magnitude?

*****All the Best*****

DEPART MENT OF MATHEMATICS III- B. Sc MATHS I- SESSIONALEXAM
VIVEKANANDA COLLEGE V SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 25
DATE: 03:01:2019 TIME: 1 HOUR

BOOLEAN ALGEBRA – 05SB61

Section A

Answer all the questions: **5×1=5**

1. If the relation ρ defined on **Z** by $a\rho b \Leftrightarrow ab\ is\ odd$, then ρ said to be
   a) reflexive and symmetric b) reflexive but not symmetric
   c) symmetric but not reflexive d) neither symmetric nor reflexive
2. If the relation ρ defined on **Z** by $a\rho b \Leftrightarrow ab\ is\ odd$, then ρ said to be
   a) reflexive b) symmetric c) transitive d) equivalence relation

3. Let S be the set of all lines in the Euclidean plane $\boldsymbol{R} \times \boldsymbol{R}$. Define $a\rho b \Leftrightarrow$ a is parallel to b. Then ρ is _________
   a) not reflexive b) not symmetric c) not transitive d)an equivalence relation

4. Let S be the set of all lines in the Euclidean plane $\boldsymbol{R} \times \boldsymbol{R}$. Define $a\rho b \Leftrightarrow$ a is perpendicular to b. Then ρ is _________
   a) reflexive b) symmetric c) transitive d) an equivalence relation
5. In **Z**, define $a\rho b \Leftrightarrow ab > 0$ then ρ is
   a) not reflexive b) not symmetric c) not transitive d)an equivalence relation

SECTION – B

Answer Any five of the following questions: **2×2=4**

6. Define reflexive relation and give an example.
7. Define symmetric relation and give an example.
8. Define transitive relation and give an example.
9. Define anti-symmetric and give an example.

SECTION – C

Answer any three of the following questions **1×6=6**

10. Let S ={10,9,8,6,5} with the relation usual $\leq$. Prove that $(S, \leq)$ is poset and obtain the diagram.
11. Define an equivalence relation and give an example.

SECTION-D

Answer any one of the following questions **1×10=10**

12. Let ρ be an equivalence relation defined on a set S. Then
    i) $a\rho b \Leftrightarrow [a] = [b]$.
    ii) Any two distinct equivalence classes are disjoint
    iii) S is the union of all the equivalence classes.
13. a) Define chain and give an example
    b) Obtain the diagram of the set of all subgroups of S_3.

ALL THE BEST

DEPARTMENT OF MATHEMATICS II- B. Sc PHY & CHE II- SESSIONALEXAM
VIVEKANANDA COLLEGE IV SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 05:03:2019 TIME: 2 HOURS

MATHEMATICS-II (05AT02)

Section A

Answer all the questions: **10×1=10**

1. The general form of the linear differential equation is ________
   a) $\frac{dy}{dx}+Py=Q$ b) $\frac{dy}{dx}+Qy=P$ c) $\frac{dy}{dx}=Q$ d) $\frac{dy}{dx}=P$.
2. The general form of Bernoulli's equation is ________
   a) $\frac{dy}{dx}+Qy=Py^n$ b) $\frac{dy}{dx}+Py=Qy^n$ c) $\frac{dy}{dx}=Qy^n$ d) $\frac{dy}{dx}=Py^n$.
3. The integrating factor of the differential equation $\frac{dy}{dx}-y\cot x=2x\sin x$ is __________
   a) cosec x b) sin x c) sec x d) cos x
4. The differential equation $Mdx+Ndy=0$ is said to be exact if __________
   a) $\frac{\partial M}{\partial x}=\frac{\partial N}{\partial y}$ b) $-\frac{\partial M}{\partial x}=\frac{\partial N}{\partial y}$ c) $\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}$ d) $-\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}$
5. The value of $d\left(\frac{y}{x}\right)=$___________
   a) $\frac{ydx+xdy}{y^2}$ b) $\frac{-ydx+xdy}{y^2}$ c) $\frac{ydy+xdx}{y^2}$ d) $\frac{ydy-xdx}{y^2}$
6. The general solution of $(D^2-4)y=0$ is ___________.
   a) $y=Ae^{2x}+Be^{-2x}$ b) $y=Ae^{4x}+Be^{-4x}$
   c) $y=Ae^{3x}+Be^{x}$ d) $y=Ae^{4x}+B$
7. The Particular integral of $(D^2+1)y=0$ is __________
   a) x b) x^2 c) 1 d) 0
8. The Particular integral of $(D^2-1)y=x$ is _________
   a) x b) $-x$ c) 1 d) 0
9. The Particular integral of $(D^2+3D+1)y=e^{-4x}$ is _______________.
   a) $\frac{e^{-4x}}{-5}$ b) $\frac{e^{-4x}}{5}$ c) $\frac{e^{4x}}{-5}$ d) $\frac{e^{4x}}{5}$
10. The roots of the differential equation $(D^2-9)y=0$ is ___________.
    a) 3,3 b) 3,-3 c) -3,-3 d) 3,2

SECTION – B

Answer Any five of the following questions: **5×2=10**

Verify whether the equations are exact or not?

11.$e^y dx + (xe^y + 2y)dy = 0$
12. $(x^2 - y)dx + (y^2 - x)dy = 0$
13. Solve the given equation $y' + xy = e^{-\frac{x^2}{2}}$.
14. Find the integrating factor of the equation $xy' + y = y^2 \log x$
15. Solve $(D^2 - 5D + 6)y = 0$.
16. Find the complementary function of the given equation $(D^2 - 4)y = e^{2x}$
17. Find the particular integral of the equation $(D^2 + 9)y = sin2x$.

SECTION – C

Answer any three of the following questions **3×6=18**

18. Solve $(D^2 - 3D + 2)y = e^{7x}$
19. Solve $(D^2 + 2D + 5)y = \sin hx$
20. Solve i) $(x^2 + y^2 + x)dx + xydy = 0$.
ii) $ydx - xdy = 0$.
21.Solve i) $(cos^3 x)y' + ycosx = sinx$.
ii) $\frac{dy}{dx} - y \cot x = 2x \sin x$.
22. Solve i) $xy - y' = y^3 e^{-x^2}$
ii) $(1 - x^2)y' - xy = x^2 y^2$

SECTION-D

Answer any one of the following questions **1×12=12**

23. Solve $(D^2 - 5D + 6)y = e^{4x}$ given that $y = 0$ and $y' = 0$ when $x = 0$.
24. Solve
a) $(D^2 - 6D + 13)y = 8e^{3x} \sin 2x + x^2 e^{5x}$
b) $(D^2 - 4D + 3)y = \sin 3x \sin 2x$.

ALL THE BEST

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II – CHEMISTRY& PHYSICS**	**SUBJECT**	**: ALLIED**
TITLE	**: MATHEMATICS – III**	**SUB. CODE**	**: O5AT03**
MONTH & YEAR	**: FEB 2019**	**DATE**	**: /02/2019**
TIME	**: 2 HOURS**	**MAX. MARKS**	**: 50**

II SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS $(10 \times 1 = 10)$

1. The value of $L(t^2) =$
   a) $\frac{1}{s^2}$ b) $\frac{1}{s^3}$ c) $\frac{2}{s^2}$ d) $\frac{2}{s^3}$
2. The value of $L(e^{at}) =$
   a) $\frac{1}{s-a}$ b) $\frac{1}{-(s-a)}$ c) $\frac{1}{s+a}$ d) $\frac{1}{-(s+a)}$
3. The value of $L(\cosh at) =$
   a) $\frac{s}{s^2+a^2}$ b) $\frac{a}{s^2+a^2}$ c) $\frac{s}{s^2-a^2}$ d) $\frac{a}{s^2-a^2}$
4. The value of $L\{f(at)\} =$
   $a)$ $aF\left(\frac{s}{a}\right)$ b) $aF(sa)$ c) $\frac{1}{a}F\left(\frac{s}{a}\right)$ d) $\frac{1}{a}F(sa)$
5. The value of $L\{tf(t)\} =$
   a) $\frac{d}{ds}F(s)$ b) $-\frac{d}{ds}F(s)$ c) $\frac{d}{ds}F(-s)$ d) $-\frac{d}{ds}F(-s)$
6. The value of $L^{-1}\left(\frac{1}{s}\right) =$
   a) 1 b) 2 c) 0 d) 3
7. The value of $L^{-1}\{F(s+a)\} =$
   a) $e^{at}L^{-1}F(s)$ b) $-e^{at}L^{-1}F(s)$ c) $e^{-at}L^{-1}F(s)$ d) $-e^{-at}L^{-1}F(s)$
8. The value of $L^{-1}\left(\frac{s+a}{(s+a)^2-b^2}\right) =$
   $a)$ $e^{-at}\cos bt$ b) $e^{-at}\cosh bt$ c) $e^{at}\cosh bt$ d) $e^{at}\cos bt$
9. The value of $L^{-1}\left(\frac{b}{(s+a)^2-b^2}\right) =$
   a) $e^{-at}\sinh bt$ b) $e^{-at}\sin bt$ c) $e^{at}\sin bt$ d) $e^{at}\sinh bt$
10. The value of $L^{-1}\left(\frac{1}{s+a}\right) =$
    a) e^{at} b) e^{-at} c) $-e^{at}$ d) $-e^{-at}$

SECTION-B

ANSWER ANY FIVE QUESTIONS $(5 X 2 = 10)$

11. If L [f(x)] = F(s), then prove that $L[e^{-ax}f(x)] = F(s+a)$.

12. If $L[e^{-at}] = \frac{1}{s+a}$, then prove that $L[\cosh at] = \frac{s}{s^2+a^2}$.

13. Find the value of L [$\sin^2 4t$].

14. Find the value of $L^{-1}\left[\frac{1}{(s+3)^2+25}\right]$.

15. Find the value of $L^{-1}\left[\frac{1}{s(s+a)}\right]$.

16. Evaluate $L^{-1}\left[\frac{1}{(s+2)^2}\right]$.

17. Evaluate $L^{-1}\left[\frac{1}{s+b}-\frac{1}{s+a}\right]$.

SECTION – C

ANSWER ANY THREE QUESTIONS $(3\ X\ 6 = 18)$

18. Find the value of L [t^2 + cos2t cost].

19. Find the value of L [t^2 e^{-at}].

20. Find the value of $L^{-1}\left[\frac{s-5}{s^2+3s+2}\right]$.

21. Evaluate $L^{-1}\left[\frac{1}{s(s+1)(s+2)}\right]$.

22. Evaluate $L^{-1}\left[\log\left(\frac{s+2}{s+3}\right)\right]$.

SECTION – D

ANSWER ANY ONE QUESTION $(1\ X\ 12 = 12)$

23. Using Laplace Transform, solve $y''+4y'+13y=2e^{-x}$, given that y(0) = 0 & y’(0) = -1.

24. Using Laplace Transform, solve $\frac{dx}{dt}+4y=\sin t$ & $\frac{dy}{dt}+x=\cos t$, given that x(0) = 2 & y(0) =0.

***** All the best *****

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST 625 234

DEPT .OF MATHEMATICS **II Year** **II Test**

Date: 06.03.2019 **TIME: 2 HOURS**

PROGRAMMING IN C++ - 05AT41

SECTION-A

ANSWER ALL QUESTIONS: (10X1=10)

1. In C++, the declaration of functions and variables are collectively called …….
   A) class members B) function members
   C) object members D) member variables
2. The keywords private and public used in C++ are known as ………….
   A) keyword labels B) visibility labels C) declaration labels D) display labels
3. The variables declared inside the class are known as data members and functions are known as
   A) data functions B) inline functions C) member functions D) member variables
4. Only the …………………. can have access to the private members and private functions.
   A) data functions B) inline functions C) member functions D) member variables
5. The binding of data and functions together into a single class-type variable is referred to as …….. ..
   A) encapsulation B) data hiding C) data abstraction D) data binding
6. C++ provides a special ________ called the constructor, which enables an object to initialize itself when it is created.
   A) friend function B) member function C) public function D) private function
7. A constructor has the same __________ as that of class.
   A) variable B) object C) function D) name
8. Constructors are normally used to _________and to allocate memory.
   A) define variables B) allocate variables
   C) initialize variables D) initialize object
9. A constructor that accepts no parameters is called the _________
   A) default constructor B) parameterized constructor
   C) implicit constructor D) null constructor
10. State whether the following statements about the constructor are True or False.
    i) constructors should be declared in the private section.
    ii) constructors are invoked automatically when the objects are created.
    A) True, True B) True, False C) False, True D) False, False

SECTION-B

ANSWER ANY FIVE QUESTIONS:- (5X2=10)

11. Define constructor
12. Define a class
13. Define operator overloading
14. Define a inline function
15. Define a creating objects
16. Define destructor
17. Define default constructor

SECTION-C

ANSWER ANY THREE QUESTIONS:- (3X6=18)

18. Analyze various declaration of class with example program
19. Write short notes on static member function and give an example program
20. Examine parameterized constructor with example
21. Describe multiple constructor with example program
22. Explain about constructor with default arguments

SECTION-D

ANSWER ANY ONE QUESTIONS:- (1X12=12)

23. Characterize copy constructor with example program.
24. Write a C++ program to add two complex numbers using binary operators overloading.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II - MATHS**	**SUBJECT**	**: CORE**
TITLE	**: SEQUENCES AND SERIES**	**SUB. CODE**	**: 05CT41**
MONTH & YEAR	**: MAR 2019**	**DATE**	**: 01/03/2019**
TIME	**: 2 HOURS**	**MAX. MARKS**	**: 50**

II SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS ($10 \times 1 = 10$)

1. A sequence _____ converge to two different limits.

(A) Can (B) cannot (C) always (D) none

2. Every bounded sequence has _____ limit points.

(A) At least one (B) at most one (C) exactly one (D) two

3. The value of $\lim_{n\to\infty} \frac{1}{n}\left(1+\frac{1}{2}+........+\frac{1}{n}\right) =$ ……..

(A) 0 (B) e (C) 1 (D) ∞

4. Example of a Cauchy sequence is ……

(A) $\frac{1}{n}$ (B)(n) (C) $\left((-1)^n\right)$ (D) $\left(n^2\right)$

5. The following statement are false except…….

(A) The range of a sequence is an infinite set (B) Any bounded sequence is convergent

(C) Any constant sequence is convergent (D) Any monotonic sequence is convergent

6. The Harmonic series $\sum \frac{1}{n^p}$ is converges if _____ and diverges if _____

(A) $p<1, p\geq 1$ (B) $p>1, p\geq 1$

(C) $p>1, p\leq 1$ (D) $p<1, p\leq 1$

7. In a Geometric series if r>1 then S_n value is

(A) $\frac{r-1}{r^n-1}$ (B) $\frac{1-r^n}{1-r}$ (C) $\frac{r^n-1}{r+1}$ (D) $\frac{r^n-1}{r-1}$

8. The series $\sum \frac{(-1)^n}{n}$ is _____

(A) Absolutely convergent (B) not absolutely convergent

(C) Divergent (D) conditionally convergent

9. Let $\sum a_n$ be a series of positive terms. Then $\sum a_n$ _____ if $\lim_{n\to\infty} \frac{a_n}{a_{n+1}} > 1.$

(A) Convergent (B) divergent (C) unbounded (D) not exist

10. If $\sum_{n=1}^{\infty} a_n$ convergent to s then……..

(A) $\lim_{n\to\infty} a_n = s$ (B) $\lim_{n\to\infty} a_n = 0$ (C) $\lim_{n\to\infty} a_n = a$ (D) $\lim_{n\to\infty} a_n = 1$

SECTION-B

ANSWER ANY FIVE QUESTIONS ($5 X 2 = 10$)

11. Prove that any Cauchy sequence is a bounded sequence.

12. Prove that any convergent sequence is a Cauchy sequence.

13. Show that $\lim_{n\to\infty} \frac{n!}{n^n} = 0$.

14. Apply Cauchy general principle of convergence to show that the series $\sum \frac{1}{n}$ is not convergent.

15. Discuss the convergence of the series $\sum \frac{1}{\sqrt{n^3+1}}$

16. Test the convergence of the series $\sum \frac{n^2+1}{5^n}$.

17. Prove that every bounded sequence has at least one limit point.

SECTION – C

ANSWER ANY THREE QUESTIONS ($3 X 6 = 18$)

18. State and prove Cauchy's second limit theorem.

19. State and prove Ceasaro's theorem.

20. Prove that every bounded sequence has a convergent subsequence.

21. State and prove Cauchy's General Principle of Convergence.

22. Discuss the convergence of the series $\sum \frac{\sqrt{n+1}-\sqrt{n}}{n^p}$.

SECTION – D

ANSWER ANY ONE QUESTION ($1 X 12 = 12$)

23. State and prove Cauchy's first limit theorem.

24. Prove that the harmonic series $\sum \frac{1}{n^p}$ converges if $p > 1$ and diverges if $p \leq 1$.

*****All the best*****

DEPART MENT OF MATHEMATICS III- B. Sc MATHS II- SESSIONALEXAM
VIVEKANANDA COLLEGE VI SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 05:03:2019 TIME: 2 HOURS

OPERATIONS RESEARCH - 05EP62

Section A

Answer all the questions: **10×1=10**

1. In a queueing system expected number of customers in the system is denoted by _____________
   a) $E(m)$ b) $E(n)$ c) $E(v)$ d) $E(w)$
2. In a queueing system expected number of customers in the queue is denoted by _____________
   a) $E(m)$ b) $E(n)$ c) $E(v)$ d) $E(w)$
3. In a queueing system expected waiting time in the queue is denoted by _____________
   a) $E(m)$ b) $E(n)$ c) $E(v)$ d) $E(w)$
4. In a queueing system expected waiting time in the system is denoted by _____________
   a) $E(m)$ b) $E(n)$ c) $E(v)$ d) $E(w)$
5. Queue can form only _________________
   a) arrivals exceeds service capacity
   b) arrivals equals service capacity
   c) service facility is capable to serve all the arrivals at a time
   d) There are more then one service facilities.
6. When there are more than one servers, customer behavior in which he moves from one queue to another is known as ________
   a) balking b) jockeying c) reneging d) alternating
7. The calling population is assumed to be infinite, when
   a) arrivals are independent of each other
   b) arrivals are dependent upon each other
   c) capacity of the system is infinite
   d) service rate is faster than arrival rate
8. Which of the following is not a key operating characteristic for a queueing system
   a) average time a customer spent waiting in the system and queue
   b) utilization factor
   c) per cent idle time
   d) none of the above
9. For a "Possion exponential, single server and infinite population" queueing model, which of the following is correct?
   a) $E(n) = E(m) - {}^{\lambda}/_{\mu}$ b) $E(m) = \lambda E(w)$
   c) $E(n) = \lambda E(v)$ d) $E(v) = E(w) + {}^{1}/_{\mu}$
10. Multiple servers may be _________________
    a) in parallel b) in service
    c) in combination of parallel and service d) all the above

SECTION – B

Answer Any five of the following questions: **5×2=10**

11. Define $E(w)$

12. A T.V repairman finds that the time spent on his jobs has an exponential distribution with 30 minutes. If he repairs sets in the order in which they came in, and if the arrivals of sets is approximately Poisson with an average rate of 10 per 8-hour a day. What is repair man's expected idle time in each day?
13. Define Model I
14. Define size of a queue
15. Define queue discipline
16. Define classification of queueing models
17. Define activity in Network Scheduling

SECTION – C

Answer Any three of the following questions: **3×6=18**

18. Explain the operating characteristics of a queueing system
19. Explain Pure Death Process.
20. Customers arrive at a sales counter manned by a single person according to Poisson process with a mean rate of 20 per hour. The time required to serve a customer has an exponential distribution with a mean rate of 100 seconds. Find i) $E(m)$ ii) $E(n)$ iii) $E(v)$ iv) $E(w)$.
21. Assume that the goods trains are coming in a yard at the rate of of 30 trains per day and suppose that the inter-arrivals times follows an exponential distribution. The service time for each time is assumed to be exponential with an average of 36 minutes. If the yard can admit 9 trains at a time. (there being 10lines, one of which reserved for shutting purposes). Calculate the probability that the yard is empty, average waiting time and find the average queue length.
22. In a car wash service facility, cars arrive for serving according to a poisson distribution with mean5 per hour. The time for washing and cleaning each car varies but is found to follow an exponential distribution with mean 10 minutes per car. The facility cannot handle more than one car at a time and has a total of 5 parking spaces.
    i) Find the effective arrival rate ii) What is the probability that an arriving car will get service immediately upon arrival? iii) Find the expected number of parking spaces occupied

SECTION – D

Answer Any one of the following questions: **1×12=12**

23. a) Explain the Poisson Probability law with mean λt. Per hour.
    b) At a railway station, only one train handle at a time. The railway yard is sufficient only for two trains to wait while other is given signal to leave the station. Trains arrive at the station at an average rate of 6 per hour and the railway station can handle them on an average 12 per hour. Assuming Poisson arrivals and exponential service distribution, find the steady-state probabilities for the various number of trains in the system. Also find the average waiting time of a new train coming into the yard
24. a) A road transport company has one reservation clerk on duty at a time. He handles information of bus schedules and make reservations. Customers

arrive at a rate of 8 per hour and the clerk can service 12 customers on an average per hour. After starting your assumptions, answer the following :

i) What is the average number of customers waiting for service of the clerk

ii) What is the average time a customer has to wait before getting service

iii) The management is contemplating to install a computer system to handle the information and reservations. This is expected to reduce the service time from 5 to 3 minutes. The additional cost of having the new system works out to Rs 50 per day. If the cost of goodwill of having to wait is estimated to be 12 paise per minute spent waiting before being served. Should the company install the computer system? Assume 8 hours working day.

b) In the production shop of a company the break down of the machines is found to be Poisson with an average rate of 3 machines per hour. Breakdown time at one machine costs Rs 40 per hour to the company. There are two choices before the company for hiring the repairman. One of the repairman is slow but cheap, the other fast but expansive. The slow-cheap repairman demands Rs 20 per hour and will repair the broken down machines exponentially at the rate of 4 per hour. The fast-expansive repairman demands Rs 30 per hour and will repair machines exponentially at an average rate of 6 per hour. Which repairman should be hired?.

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II - MATHS**	**SUBJECT**	**: SBS**
TITLE	**: COMPETITIVE MATHEMATICS**	**SUB. CODE**	**: 05SB41**
MONTH & YEAR	**: FEB 2019**	**DATE**	**: 28/02/19**
TIME	**: 1 HOUR**	**MAX. MARKS**	**: 25**

II SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS ($5 \times 1 = 5$)

1. Present ages of X and Y are in the ratio 5:6 respectively. Seven years hence this ratio will become 6:7 respectively. What is X's present age in years?

(a) 35 (b) 42 (c) 49 (d) 52

2. Seven years ago, the ratio of the ages of Kunal and Sagar was 6:5. Four years hence, the ratio of their ages will be 11:10. What is Sagar's age at present?

(a) 16 years (b) 18 years (c) 20 years (d) 22 years

3. A man 24 years older than his son. In two years, his age will be twice the age of his son. The present age of his son is?

(a) 14 years (b) 18 years (c) 20 years (d) 22 years

4. What is 15% of 34?

(a) 3.40 (b) 3.75 (c) 4.50 (d) 5.10

5. What percent of 7.2 kg is 18 gms?

(a) 0.025% (b) 0.25% (c) 2.5% (d) 25%

SECTION – B

ANSWER ANY TWO QUESTIONS (2 X 2 = 4)

6. The ratio of the present ages of two brothers is 1:2 and 5 years back, the ratio was 1:3. What will be the ratio of their ages after 5 years?
7. The ratio of the father's age to his son's age is 7:3. The product of their ages is 756. What is the ratio of their ages after 6 years?
8. Express as rate percent of $6\frac{3}{4}$?
9. Evaluate: 28% of 450 + 45% of 280?

SECTION – C

ANSWER ANY ONE QUESTION (1 X 6 = 6)

10. Rohit was 4 times as old as his son 8 years ago. After 8 years Rohit will be twice as old as his son. What are their present ages?
11. If 50% of (x-y) is 30% of (x+y), then what percent of x is y?

SECTION –D

ANSWER ANY ONE QUESTION (1 X 10 = 10)

12. Mani's age after six years will be three seventh of his father's age. Ten years ago, the ratio of their ages was 1:5. What is Mani's father's age at present?
13. Mr.Jones gave 40% of the money he had, to his wife. He also gave 20% of the remaining amount to each of his three sons. Half of the amount now left was spent on miscellaneous items and the remaining amount Rs.12, 000 was deposited in the bank. How much money did Mr.Jones have initially?

***** All the Best*****

DEPART MENT OF MATHEMATICS III- B. Sc MATHS II- SESSIONALEXAM
VIVEKANANDA COLLEGE VI SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 25
DATE: 28:02:2019 TIME: 1 HOUR

BOOLEAN ALGEBRA – 05SB62

Section A

Answer all the questions: **5×1=5**

1. The least element of the poset $\wp(A)$, where A is a non-empty set
   a) A b) φ c) $\wp(A)$ d) $singleton\ set\ of\ A$
2. The greatest element of the poset $\wp(A)$, where A is a non-empty set
   a) A b) φ c) $\wp(A)$ d) $singleton\ set\ of\ A$
3. The least element of the poset $(\boldsymbol{N}, \leq)$
   a) 1 b) 2 c) 3 d) 0
4. The greatest element of the poset $(\boldsymbol{N}, \leq)$
   a) 1 b) 2 c) 3 d) none
5. The least element of the poset $(\boldsymbol{Z}, \leq)$
   a) 1 b) 2 c) 3 d) none.

SECTION – B

Answer Any two of the following questions: **2×2=4**

6. Define chain and give an example
7. Obtain the diagram for the poset (S,≤) where S ={10,9,8,6,5} with the relation usual ≤.
8. Define least element of the poset and give an example.
9. Define anti-symmetric and give an example.

SECTION – C

Answer any one of the following questions **1×6=6**

10. Let L be a lattice. Let $a, b, c, d \in L$. Then $a \leq b$ and $c \leq d \Longrightarrow$
    i) $a \vee c \leq b \vee d$ and
    ii) $a \wedge c \leq b \wedge d$.
11. Let S ={1,2,3, 5,6,10,15,30}: $a \leq b \Leftrightarrow a\ divides\ b$. Prove that $(S, \leq)$ is poset and obtain the diagram.

SECTION-D

Answer any one of the following questions **1×10=10**

12. Find all the sub- lattices of the lattices M_5 and N_5.
13. a) Let L be a lattice. Let $a, b \in L$. Then prove that the following statements are equivalent i) $a \leq b$, ii) $a \vee b = b$ iii) $a \wedge b = a$.
    b) Let L be a lattice. Let $a, b, c \in L$. Then state and prove the idempotent law, associative law, commutative law and absorption law.

ALL THE BEST

DEPARTMENT OF MATHEMATICS II- B. Sc PHY & CHE III- SESSIONALEXAM
VIVEKANANDA COLLEGE IV SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 11:04:2019 TIME: 2 HOURS

MATHEMATICS-II (05AT02)

Section A

Answer all the questions: **10×1=10**

1. In a homogeneous linear equations, $xDy =$ ______
   a) θx b) θz c)θt d) θy

2.. In a homogeneous linear equations, $x^2D^2y =$ ______
   a) $\theta(\theta-1)x$ b) $\theta(\theta-1)z$ c)$\theta(\theta-1)y$ d) $\theta(\theta-1)t$

3.. The Auxiliary equation of the differential equation $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + 7 = 0$ is
   a) $(m+1)^2 = 6$ b) $(m-1)^2 = 6$ c) $(m+1)^2 = -6$ d) $(m-1)^2 = -6$

4. The Auxiliary equation of the differential equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$ is ________
   a) (m^2 +1)=0 b) (m^2 -1)= 0 c) $(m-1)^2 = 0$ d) $(m+1)^2 = 0$

5. The particular integral of the differential equation $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + 7 = 0$ is
   a) 1 b) 2 c) 3 d) 0

6. The general term of the Simultaneous differential equations of first order and first degree is ____
   a) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ b) $Pdx = Qdy = Rdz$ c) $\frac{dx}{1} = \frac{dy}{2} = \frac{dz}{4}$ d) $\frac{dx}{3} = \frac{dy}{4} = \frac{dz}{7}$

7.. One of the solution of the differential equation $\frac{dx}{yz} = \frac{dy}{xz} = \frac{dz}{xy}$ is ________
   a) $x^3 - y^3 = 0$ b) $x^4 - y^4 = 0$ c) $x^2 - y^2 = 0$ d) $x - y = 0$

8. One of the solution of the differential equation $\frac{dx}{xy} = \frac{dy}{y^2} = \frac{dz}{x(yz-2x)}$ is ________
   a) $\frac{x}{y}$ b) $\frac{y}{x}$ c) $\frac{y}{z}$ d) $-\frac{x}{y}$

9. The general solution of the differential equation $\frac{dx}{2} = \frac{dy}{1} = \frac{dz}{4}$ is _____
   a) $\phi(x-2y, 4y-z) = 0$ b) $\phi(2x-y, y-4z) = 0$
   c) $\phi(x-y, y-z) = 0$ d) $\phi(2x-2y, 4y-4z) = 0$

10. One of the solution of the differential equation $\frac{dx}{2} = \frac{dy}{3} = \frac{dz}{x(yz-2x)}$ is ________
   a) $x - 2y = c$ b) $3x - 2y = c$ c) $x + 2y = c$ d) $-x + 2y = c$

SECTION – B

Answer Any five of the following questions: **5×2=10**

11. Solve $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$

Find the auxiliary equation of the following differential equation

12. $x^2\frac{d^2y}{dx^2}+3x\frac{dy}{dx}+y=0$

13. $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}-2y=0$

14. $x^2\frac{d^2y}{dx^2}-2x\frac{dy}{dx}-4y=0$

15. $x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}+2y=0$

16. Find the complementary function of the equation $y''-y=0$

17. Find the complementary function of the equation $y''+y=0$

SECTION – C

Answer any three of the following questions **3×6=18**

18. Solve $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}-2y=e^x$
19. Solve $y''+y=cosec\ x$
20. Solve $y''+y=x$
21. **Solve** $z^2dx+(z^2-2yz)dy+(2y^2-yz-xz)dz=0$
22. **Solve** $3x^2dx+3y^2dy-(x^3+y^3+e^{2z})dz=0$

SECTION-D

Answer any one of the following questions **1×12=12**

23. Solve $(2x+1)^2\frac{d^2y}{dx^2}-2(2x+1)\frac{dy}{dx}-12y=6x.$
24. Apply the method of variation of parameters to solve
    a) $y''+3y'+2y=x^2$ b) $y''+y=sec\ x.$

ALL THE BEST

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II – CHEMISTRY& PHYSICS**	**SUBJECT**	**: ALLIED**
TITLE	**: MATHEMATICS – III**	**SUB. CODE**	**: O5AT03**
MONTH & YEAR	**: APR 2019**	**DATE**	**: 04/04/2019**
TIME	**: 2 HOURS**	**MAX. MARKS**	**: 50**

III SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS $(\mathbf{10 \times 1 = 10})$

1. Fourier series is also called as
   a) Power series b) Trigonometric series c) Exponential series d) Logarithmic series
2. In the Fourier series, the Fourier coefficients are
   a) a_0 & a_n only b) b_n only c) a_0, a_n & b_n d) None of them
3. The function f(x) is even if
   a) f(-x) = f(x) b) f(-x) = - f(x) c) f(-x) < f(x) d) f(-x) > - f(x)
4. The function f(x) is odd if
   a) f(-x) = f(x) b) f(-x) = - f(x) c) f(-x) < f(x) d) f(-x) > - f(x)
5. The product of Even function and Odd function is
   a) Neither even nor odd b) Even c) Odd d) Both
6. In the Odd function, the Fourier coefficient a_0 & a_n is
   a) 0 b) 1 c) 2 d) π
7. In the Even function, the Fourier coefficient b_n is
   a) π b) 2 c) 1 d) 0
8. The half range cosine series has
   a) Cosine only b) Sine only c) Both Cosine & Sine d) None of them
9. The half range sine series has
   a) Cosine only b) Sine only c) Both Cosine & Sine d) None of them
10. The value of $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots$ is
    a) $\frac{\pi}{4}$ b) $\frac{\pi^2}{6}$ c) $\frac{\pi^2}{12}$ d) $\frac{\pi^2}{8}$

SECTION-B

ANSWER ANY FIVE QUESTIONS $(\mathbf{5\ X\ 2 = 10})$

11. Define Fourier series.
12. Define Odd and Even function.
13. Determine the Fourier coefficient a_0 of the function f(x) = x in $-\pi \le x \le \pi$.
14. Expand Bernoulli's formula of $\int u\, dv$.
15. Verify whether the following function even or odd: $f(x) = \begin{cases} \pi + 2x; & -\pi < x < 0 \\ \pi - 2x; & 0 < x < \pi \end{cases}$
16. Define Half range Cosine series.

17. Find the Half range Sine series coefficient b_n from the function f(x) = x in $0 \le x \le \pi$.

SECTION – C

ANSWER ANY THREE QUESTIONS ($3 \, X \, 6 = 18$)

18. Obtain the Fourier series for f(x) = x(2π-x) in 0 < x < 2π.

19. Find the Fourier series for f(x) = x + x^2 in $-\pi \le x \le \pi$.

20. Find the Fourier series for f(x) = e^x defined in [-π,π].

21. Find the Half range Sine series for f(x) = x in $0 \le x \le \pi$ and deduce that $1 - \frac{1}{3} + \frac{1}{5} - \ldots = \frac{\pi}{4}$.

22. Find the Half range Cosine series for the function f(x) = x^2 in $0 \le x \le \pi$ and hence find the sum of the series $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots$

SECTION – D

ANSWER ANY ONE QUESTION ($1 \, X \, 12 = 12$)

23. Find the Fourier series for the function f(x) = x^2 in $-\pi \le x \le \pi$ and deduce that

(i) $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots = \frac{\pi^2}{6}$ (ii) $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \ldots = \frac{\pi^2}{12}$ &

(iii) $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}$

24. Find the Half range Sine series for f(x) = x(π - x) in (0,π). Deduce that $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \ldots = \frac{\pi^3}{32}$.

***** All the best *****

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST-625234
DEPARTMENT OF MATHEMATICS II Year

Date: 12.04.2019 **Time: 2Hrs**

III Test Marks: 50

Programming in C++ - 05AT41

Section-A **(1 X 10 =10)**

Answer All Questions:

1. C++ provides a special __ called the constructor, which enables an object to initialize itself when it is created.
   A) friend function B) member function C) public function D) private function
2. A constructor has the same ___________ as that of class.
   A) variable B) object C) function D) name
3. Constructors are normally used to __________and to allocate memory.
   A) define variables B) allocate variables C) initialize variables D) initialize object
4. A constructor that accepts no parameters is called the __________
   A) default constructor B) parameterized constructor C) implicit constructor D) null constructor
5. State whether the following statements about the constructor are True or False.
   i) constructors should be declared in the private section.
   ii) constructors are invoked automatically when the objects are created.
   A) True, True B) True, False C) False, True D) False, False
6. What does inheriatance allows you to do?
   A. create a class B. create a hierarchy of classes C. access methods D. None of the mentioned
7. A derived class with only one base class is called ___________ inheritance
   a) single b) multilevel c) multiple d) hybrid
8. The mechanism of deriving a new class from an old one is called __________
   a) polymorphism b) inheritance c) base class d) derived class
9. How many types of inheritance are there in C++?
   A. 2 B. 3 C. 4 D. 5
10. Which among the following best describes the Inheritance?
    a) Copying the code already written b) Using the code already written once
    c) Using already defined functions in programming language
    d) Using the data and functions into derived segment

Section-B **(5 X 2=10)**

ANSWER ANY FIVE QUESTIONS:

11. Define construction
12. Define Arrays
13. Define Destructions
14. Define Inheritance
15. Define Derived class
16. Define single Inheritance
17. Define abstract classes

Section-C **(3 X 6 =18)**

ANSWER ANY THREE QUESTIONS :

18. Explain about constructor with are example
19. Explain about Multiple constructor with example
20. Explain about operator overloading with example program
21. Explain about multiple inheritance
22. Explain about hierarchical inheritance.

Section-D **(1X 12=12)**

ANSWER ANY ONE QUESTION:

23.Explain about multilevel and hyprit inheritance.

24. Analyse single inheritance with example program.

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DEPART MENT OF MATHEMATICS I- B. Sc MATHS III- SESSIONALEXAM
VIVEKANANDA COLLEGE II SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 12:04:2019 TIME: 2 HOURS

ANALYTICAL GEOMETRY (3D) AND VECTOR CALCULUS- 05CT22

Section A

Answer all the questions: **10×1=10**

1. The image of the point (1,2,3) under the reflection in the xy – plane is (CO1)
   a) (1,2,3) b) (1,2,-3) c) (1,-2,3) d) (-1, 2, 3)
2. The mirror reflection of the point (1,1,1) in the yz- plane is ____ (CO1)
   a) (1,1,-1) b) (1,-1,1) c) (-1,1,1) d) (1,1,1)
3. The equation of the *xy*- plane is_______ (CO1)
   a) $x = 0$ b) $x = 0 = y$ c) $z = 0$ d) $x = 0 = z.$
4. The direction ratios of the line $\frac{x-1}{2} = \frac{y-2}{-3} = \frac{z-3}{4}$ is __ (CO2)
   a) 1,2,3 b) 1,2,-3 c) 2,3,4 d) 2,-3,4
5. Two straight lines in space which are not coplanar are called _____ lines (CO2)
   a) parallel b) perpendicular c) skew d) none
6. The plane section of the sphere is a ________ (CO3)
   a) sphere b) circle c) ellipse d) cylinder
7. The value of $\iiint_0^a dxdydz =$______ (CO5)
   a) a^3 b) a^2 c) a d) 1
8. The value of $\iiint_0^a x^2 ydzdydx =$______ (CO5)
   a) $\frac{a^6}{5}$ b) $\frac{a^6}{6}$ c) $\frac{a^6}{2}$ d) $\frac{a^6}{7}$
9. The value of $\iiint_0^a x^2 dzdydx =$______ (CO5)
   a) $\frac{a^5}{5}$ b) $\frac{a^5}{6}$ c) $\frac{a^5}{2}$ d) $\frac{a^5}{7}$
10. A vector $\vec{f}$ is called harmonic vector if ______ (CO5)
    a) $\nabla\vec{f} = 0$ b) $\nabla^2\vec{f} = 0$ c) $\nabla\vec{f} = \vec{f}$ d) $\nabla^2\vec{f} = \vec{f}$

SECTION – B

Answer Any five of the following questions: **5×2=10**

Find the center and radius of the given Spheres

11. $x^2 + y^2 + z^2 = 9$ (CO3)
12. $x^2 + y^2 + z^2 - 2x - 4y - 6z = 16$ (CO3)
13. Find the equation of the sphere whose center is (1.-2, 5) and radius is 3 (CO3)

14. Find the equation of the straight line which passes through the points (2,3,4) and (7,5,6) (CO2)

15. Define Green's theorem (CO5)

16. Define Gauss divergence theorem (CO5)

17. Show that $\int_S \vec{r}.\vec{n}\,ds = 3V$, where V is the volume enclosed by S and $\vec{r}$ is the position vector. (CO5)

SECTION – C

Answer Any three of the following questions: **3×6=18**

18. Obtain the equation of the sphere having the circle (CO3)
$S: x^2 + y^2 + z^2 - 3x + 4y - 2z - 5 = 0$ $\pi: 5x - 2y + 4z + 7 = 0$ as a great circle.

19. Show that the lines $\frac{x-2}{1} = \frac{y-4}{2} = \frac{z-5}{2}$ and $\frac{x-5}{2} = \frac{y-8}{3} = \frac{z-7}{2}$ are coplanar and find the equation of the plane containing them. (CO2)

20. Find the length of the shortest distance between the two lines $\frac{x+3}{-4} = \frac{y-6}{6} = \frac{z}{2}$ and $\frac{x+2}{-4} = \frac{y}{2} = \frac{z-7}{3}$. (CO2)

21. Verify Green's theorem for the function $\vec{f}(x^2 + y^2)\vec{\imath} - 2xy\vec{\jmath}$ and C is the rectangle in the xy- plane bounded by $x = 0$ to $x = a$ and $y = 0$ to $y = b$ (CO5)

22. Show that if $\vec{f} = x^3\vec{\imath} + y^3\vec{\jmath} + z^3\vec{k}$, $\iint_S \vec{f}.\vec{n}\ ds = \frac{12}{5}\pi a^5$ where S is a sphere of radius a (CO5)

SECTION – D

Answer Any one of the following questions: **1×12=12**

23. a) Find the equation of the sphere which passes through the circle $x^2 + y^2 + z^2 - 2x + 2y + 4z - 3 = 0$; $2x + y + z - 4 = 0$ and touch the plane $3x + 4y - 14 = 0$. (CO3)

b) Find the equation of the sphere passing through the circle $x^2 + y^2 + z^2 - 4 = 0$; $2x + 4y + 6z - 1 = 0$ and having its center on the plane $x + y + z = 6$. (CO3)

24. Evaluate $\iint_S \vec{f}.\vec{n}\ ds$ where $\vec{f} = (x + y^2)\vec{\imath} - 2x\vec{\jmath} + 2yz\vec{k}$ and S is the surface of the plane $2x + y + 2z = 6$ in the first octant (CO5)

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II - MATHS**	**SUBJECT**	**: CORE**
TITLE	**: SEQUENCES AND SERIES**	**SUB. CODE**	**: 05CT41**
MONTH & YEAR	**: APR 2019**	**DATE**	**: 08/04/2019**
TIME	**: 2 HOURS**	**MAX. MARKS**	**: 50**

III SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS ($10 \times 1 = 10$)

1. If the n^{th} term of a series is $a_n = \frac{1.2.3.........n}{3.5.7..........2n-1}$ then $\lim_{n\to\infty} \frac{a_n}{a_{n+1}} =$…….

(A) 1 (B) 2 (C) $\frac{1}{2}$ (D) 0

2. The series $\sum \frac{(-1)^n \sin n\alpha}{n^3}$ is _____

(A) Converges (B) diverges (C) oscillates (D) absolutely convergent

3. Let $\sum a_n$ be a series of positive terms.

The correct statement from the following is……..

(A) $\sum a_n$ convergent if $\lim_{n\to\infty} \frac{a_n}{a_{n+1}} > 1$ (B) $\sum a_n$ convergent if $\lim_{n\to\infty} \frac{a_n}{a_{n+1}} < 1$

(C) $\sum a_n$ convergent if $\lim_{n\to\infty} \frac{a_{n+1}}{a_n} > 1$ (D) $\sum a_n$ convergent if $\lim_{n\to\infty} \frac{a_{n+1}}{a_n} > 0$

4. Let $\sum a_n$ be a series of positive terms. Then $\sum a_n$ is convergent if $\lim_{n\to\infty} \frac{a_n}{a_{n+1}} > 1$ and divergent if $\lim_{n\to\infty} \frac{a_n}{a_{n+1}} < 1$ this test is known as………

(A) Cauchy's root test (B) D' Alembert's ratio test (C) Gauss test (D) Roobe's test

5. The radius of convergence R is

(A) $\lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right|$ (B) $\lim_{n\to\infty} \left|\frac{a_n}{a_{n+1}}\right|$ (C) $\lim_{n\to 0} \left|\frac{a_n}{a_{n+1}}\right|$ (D) none

6. A series $\sum a_n$ is said to be absolutely convergent if _____.

(A) $\sum a_n$ Convergent (B) $\sum a_n$ divergent (C) $\sum |a_n|$ is convergent (D) $\sum |a_n|$ is divergent

7. If $a_n = \frac{n!}{n^n}$ Then $\lim_{n\to\infty} \frac{a_n}{a_{n+1}} =$…….

(A) e (B) 1 (C) 0 (D) $\frac{1}{e}$

8. Apply the ratio test for $1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + ... + \frac{1}{n!} + ...$ the series is……….

(A) Convergent (B) divergent

(C) Neither convergent nor divergent (D) both convergent and divergent

9. The value of $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n$ =……..

(A) 0 (B) 1 (C) -1 (D) $\boldsymbol{e}$

10. The power series $\sum \frac{x^n}{n!}$ for all values of x which is………..

(A) Convergent (B) convergent absolutely (C) divergent (D) oscillating

SECTION-B

ANSWER ANY FIVE QUESTIONS ($\mathbf{5\ X\ 2 = 10}$)

11. Discuss the convergence of the series $\sum \frac{1}{\sqrt{n^3+1}}$.

12. Test the convergence of the series $\sum \frac{n^2+1}{5^n}$.

13. If $\sum c_n$ converges and if $\lim_{n\to\infty}(\frac{a_n}{c_n})$ exists and is finite then prove that $\sum a_n$ converges.

14. State D' Alembert's ratio test.

15. State Cauchy root test.

16. Show that the series $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\dots$ converges.

17. Define conditionally convergent of a series.

SECTION – C

ANSWER ANY THREE QUESTIONS ($\mathbf{3\ X\ 6 = 18}$)

18. State and prove Cauchy's General Principle of Convergence.

19. Test the convergence of the series $\sum \frac{x^n}{n}$.

20. Prove that any absolutely convergent series is convergent.

21. Prove that the sum of an absolutely convergent series is unaltered by any rearrangement of its terms.

22. Let $\sum a_n x^n$ be the given power series. Let $\alpha = \lim\sup |a_n|^{1/n}$ and R $=\frac{1}{\alpha}$. Then prove that $\sum a_n x^n$ converges absolutely if $|x| < R$. If $|x| > R$ the series is not converges.

SECTION – D

ANSWER ANY ONE QUESTION ($\mathbf{1\ X\ 12 = 12}$)

23. Prove that the harmonic series $\sum \frac{1}{n^p}$ converges if $p > 1$ and diverges if $p \leq 1$.

24. State and prove Abel's theorem.

*****All the best*****

DEPART MENT OF MATHEMATICS III- B. Sc MATHS III- SESSIONALEXAM
VIVEKANANDA COLLEGE VI SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 11:04:2019 TIME: 2 HOURS

OPERATIONS RESEARCH - 05EP62

Section A

Answer all the questions: **10×1=10**

1. In the context of network, which of the following is correct
   a) A network is a graphic representation of activities and nodes
   b) A project network cannot have multiple initial and final nodes
   c) An arrow diagram is essentially a closed network
   d) An arrow representing an activity may not have a length and shape
2. The objective of network analysis is to
   a) minimize total project cost
   b) minimize total project duration
   c) minimize production delays, interruption and conflicts
   d) all the above
3. Network problems have advantage in terms of project
   a) scheduling b) planning c) controlling d) all the above
4. In critical path Analysis, the word CPM means
   a) Critical Path Method b) Crash Project Management
   c) Critical Project Management d) Critical Path Management
5. In critical path analysis, CPM is
   a) event oriented b) probabilistic in nature
   c) deterministic in nature d) dynamic in nature
6. The slack for an activity in network, is equal to
   a) LS-ES b) LF-LS c) EF-ES d) EF-LS
7. The term commonly used for activity slack time is
   a) free float b) independent float c) total float d) all the above
8. An activity in the network
   a) represents a task which has a definite beginning and a definite end
   b) cannot start unless all its immediate predecessors are completed
   c) have float zero if it is critical, otherwise total as positive in case of non – critical
   d) all the above
9. If an activity has zero slack, it implies that
   a) it is a dummy activity b) it lies on the critical path
   c) there are more than one critical paths d) the project is progressing well.
10. The activity which can be delayed without affecting the execution of the immediate succeeding activity is determined by
    a) total float b) independent float c) free float d) interfering float

SECTION – B

Answer Any five of the following questions: **5×2=10**

11. Define activity in Network Scheduling by PERT/CPM
12. Define Fulkerson’s Rule
13. Define total float
14. Define free float
15. Define Sequencing
16. What are the basic term used in sequencing?
17. Define independent float

SECTION – C

Answer Any three of the following questions: **3×6=18**

18. A project consists of a series of tasks labelled A, B, C, . . . H, I with the notation construct the network diagram having the following constraints:
A < D,E; B, D < F; C < G; B,G < H; F,G < I.
Also find the project completion time

19. Differentiate between PERT and CPM in Network Scheduling

20. In a factory there are six jobs to perform, each of which should go through two machines A and B, in order A, B. The processing timings (hours) for the jobs are given below

Job	J_1	J_2	J_3	J_4	J_5	J_6
Machine A	1	3	8	5	6	3
Machine B	5	6	3	2	2	10

Find the value of total elapsed time T

21. Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information processing time on machines is given in hours and passing is not allowed

Job	A	B	C	D	E	F	G
Machine M_1	3	8	7	5	9	8	7
Machine M_2	4	3	2	5	1	4	3
Machine M_3	6	7	5	11	5	6	12

22. A firm considering of a replacement of a machine, whose cost price is Rs 12,200 and the scarp value Rs 200. The running cost in rupees are foundfromthe experience to be as follows

Year	1	2	3	4	5	6	7	8
Running cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

SECTION – D

Answer Any one of the following questions: **1×12=12**

23. A project consists of eight activities with the following relevant information:

Activity	Immediate predecessor	Estimated duration (days)		
		Optimestic	Most Likely	Pessimistic
A		1	1	7
B		1	4	7
C		2	2	8
D	A	1	1	1
E	B	2	5	14
F	C	2	5	8
G	D, E	3	6	15
H	F, G	1	2	3

i) Draw PERT Network and find the expected completion time
ii) What duration will have 95% Confidence for the project Completion?
iii) If the average duration for activity F increases to 14 days what will be its effect on the expected project completion time which will have 95% confidencs

(For standard normal Z= 1.645 area under the standard normal curve from O to Z is 0.45)

24. a) Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information processing time on machines is given in hours and passing is not allowed

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

b)i) Machine A costs Rs 9,000. Annual operating costs are Rs 200 for first year and then increases by Rs 2000 for every year

ii) Machine B costs Rs 10,000. Annual operating costs are Rs 400 for first year and then increases by Rs 800 for every year. Find the replacement year of both machines and compare it

DEPARTMENT OF MATHEMATICS I- B.A/B.SC SESSIONALEXAM
VIVEKANANDA COLLEGE II SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 50
DATE: 10:04:2019 TIME: 2 HOURS

STATISTICS AND OPERATIONS RESEARCH – 05NE21

Section A

Answer all the questions: **10×1=10**

1. The Arithmetic mean is denoted by ________
   a) $\sum x_i$ b) x_i c) $\bar{x}$ d) x
2. The weighted mean is denoted by ________
   a) $\sum x_i$ b) $\overline{x_w}$ c) $\bar{x}$ d) x
3. The arithmetic mean of the numbers 1,2,3,4,5 is __________
   a) 5 b) 2 c) 4 d) 3
4. The median of the set of numbers 6,8,2,5,9,5,3,2,5 is __________
   a) 5 b) 3 c) 9 d) 7
5. The mode of the set of numbers 6,8,2,5,9,5,3,2,5 is __________
   a) 5 b) 3 c) 9 d) 7
6. Linear programming involving _______ variables to solved by a graphical method easily
   a) one b) three c) two d) no
7. In a transportation problem demand is also called ______
   a) required b) available c) supply d) none
8. In a transportation problem supply is also called ______
   a) required b) available c) demand d) none
9. The transportation problem is a ________ class of a LPP.
   a) particular b) special c) ordinary d) none
10. The assignment problem is a _______ case of transportation problem.
   a) special b) particular c) ordinary d) none

SECTION – B

Answer Any five of the following questions: **5×2=10**

11. Find the mean of the frequency distribution

x_i	15	16	17	18	19
f_i	2	1	3	3	1

12. Find the mean and mode of the distribution 2,4,5,6,7,8,3,2,1
13. Find the median of the distribution 66,65,64,70,61,60,56,63,60,67,62.
14. Find the quartiles of the distribution 66,65,64,70,61,60,56,63,60,67,62.
15. Solve $max\, z = x + 2y$
   Subject to the constraints

$$x + y \leq 4, 2x - y \leq 2 \text{ and } x, y \geq 0$$

16. Solve $max\, z = 2x + 2y$

Subject to the constraints $x + y \leq, 2x - y \leq 2 \text{ and } x, y \geq 0$

17. Solve the transportation problem using NWC

	D_1	D_2	D_3	Supply
O_1	2	7	4	5
O_2	3	3	1	8
O_3	5	4	7	7
O_4	1	6	2	14
Demand	7	9	18	

SECTION – C

Answer any three of the following questions **3×6=18**

18. Calculate the arithmetic mean from the following frequency

Weights in Kgs	50	48	46	44	42	40
No.Of Persons	12	14	16	13	11	09

19. Obtain the median for the following frequency distribution

x	1	2	3	4	5	6	7	8	9
f	8	10	11	16	20	25	15	9	6

20. Solve max $z = 6x_1 + 9x_2$

Subject to the constraints $2x_1 + 2x_2 \leq 24$,

$x_1 + 5x_2 \leq 44$,

$6x_1 + 2x_2 \leq 60$ and $x_1, x_2 \geq 0$

21. Solve max $z = 6x_1 + 15x_2$

Subject to the constraints $5x_1 + 3x_2 \leq 15$,

$2x_1 + 5x_2 \leq 10$,

and $x_1, x_2 \geq 0$

22. Solve the assignment problem

	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

SECTION-D

Answer any one of the following questions **1×12=12**

23.a) Find the median and quartiles of the data

Value	1	2	3	4	5	6	7	8	9
Frequency	7	11	16	17	26	31	11	1	1

b) Find the weighed mean for the data

Price	1.36	1.40	1.44	1.48	1.52	1.56
Quantity	14	11	9	6	4	2

24. a) Solve the transportation problem using VAM

	D_1	D_2	D_3	D_4	
S_1	20	25	28	31	200
S_2	32	28	32	41	180
S_3	18	35	24	32	110
S_4	0	0	0	0	50
	150	40	180	170	

b) Solve the assignment problem

	E	F	G	H
A	1	4	6	3
B	9	7	10	9
C	4	5	11	7
D	8	7	8	

ALL THE BEST

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST

DEPARTMENT OF MATHEMATICS

CLASS	**: II - MATHS**	**SUBJECT**	**: SBS**
TITLE	**: COMPETITIVE MATHEMATICS**	**SUB. CODE**	**: 05SB41**
MONTH & YEAR	**: APR 2019**	**DATE**	**: 06/04/19**
TIME	**: 1 HOUR**	**MAX. MARKS**	**: 25**

III SESSIONAL EXAMINATION

SECTION-A

ANSWER ALL THE QUESTIONS ($5 \times 1 = 5$)

1. If 2A = 3B = 4C, then A : B : C is

(a) 2 : 3 : 4 (b) 4 : 3 : 2 (c) 6 : 4 : 3 (d) 20 : 15 : 2

2. By selling an article for Rs.100, a man gains Rs.15. Then, his gain % is

(a) 15 (b) $12\frac{2}{3}$ (c) $17\frac{11}{17}$ (d) $17\frac{1}{4}$

3. Anand and Deepak started a business investing Rs.22,500 and Rs.35,000 respectively. Out of a total profit of Rs.13,800 Deepak's share is ?

(a) 5400 (b) 7200 (c) 8400 (d) 9600

4. A man buys an article for Rs.2750 and sells it for Rs.2860. The gain percent is?

(a) 3.5 (b) 3.75 (c) 4 (d) 4.25

5. If 15% of x = 20 % of y then x : y is equal to

(a) 3 : 4 (b) 4 : 3 (c) 17 : 16 (d) 16 : 17

SECTION – B

ANSWER ANY TWO QUESTIONS (2 X 2 = 4)

6. If a radio is purchased for Rs.490 and sold for Rs.465.50, find the loss percent?
7. Find the cost price if the selling price is Rs.4060 and gain percent is 16%?
8. Find the mean proportional between 0.08 and 0.18?
9. If x : y = 5 : 2 then find the value of (8x + 9y) : (8x + 2y)?

SECTION – C

ANSWER ANY ONE QUESTION (1 X 6 = 6)

10. A book was sold for Rs.2750 with a profit of 10%. If it were sold for Rs.2575, then what would have been the percentage of profit or loss?
11. If the cost price is 96 % of the selling price, then what is the profit percent?

SECTION –D

ANSWER ANY ONE QUESTION (1 X 10 = 10)

12. A, B and C enter into a partnership each investing Rs.20,000. After 5 months, A withdrew Rs.5,000; B withdrew Rs.4,000 and C invests Rs.6,000 more. At the end of the year, a total profit of Rs.69,900 was recorded. Find the share of each?
13. A, B and C enter into a partnership by investing in the ratio of 3 : 2 : 4. After one year, B invests another Rs.2,70,000 and at the end of 2 years, C also invests Rs.2,70,000. At the end of the three years, profit are shared in the ratio of 3 : 4 : 5. Find the initial investment of each?

***** All the Best*****

DEPART MENT OF MATHEMATICS III- B. Sc MATHS III- SESSIONALEXAM
VIVEKANANDA COLLEGE VI SEMESTER
TIRUVEDAKAM WEST MAX.MARKS: 25
DATE: 06:04:2019 TIME: 1 HOUR

BOOLEAN ALGEBRA – 05SB62

Section A

Answer all the questions: **5×1=5**

1. Any Chain is a ___________ lattice.
   a) distributive b) modular c) both d) none
2. Any distributive lattice is a ___________
   a) modular lattice b) Boolean Algebra c) both d) none
3. The lattice M_5 is a ____________
   a) distributive lattice b) modular lattice
   c) both d) neither
4. In any lattice, the complement of 0 is __________
   a) 1 b) 0 c) 2 d) none
5. In any lattice, the complement of 1 is __________
   a) 1 b) 0 c) 2 d) none

SECTION – B

Answer Any two of the following questions: **2×2=4**

6. Define a distributive lattice and give an example.
7. Define a modular lattice and give an example.
8. Define a complement of an element in a lattice.
9. Define a Boolean Algebra and give an example.

SECTION – C

Answer any one of the following questions **1×6=6**

10. In any Lattice $L_5: a \vee (b \wedge c) = (a \vee b) \wedge (a \vee c)$ and $L_5{}': a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$ are equivalent.
11. Draw the lattice diagram for $(D_{70}, /)$ the Boolean Algebra of all divisors of 70. Find its atoms. Show that it is isomorphic to the Boolean Algebra $(\wp(\{1,2,3\}), \subseteq)$.

SECTION-D

Answer any one of the following questions **1×10=10**

12. a) Prove that the lattice of normal sub groups of any group is a modular lattice.
    b) Show that N_5 is neither distributive lattice nor modular lattice.
13. Draw the lattice diagram for $(D_{210}, /)$ the Boolean Algebra of all divisors of 210. Find its atoms. Show that it is isomorphic to the Boolean Algebra $(\wp(\{1,2,3,4\}), \subseteq)$.

ALL THE BEST